SEMMPF349

Carrying out thermal spraying activities

Overview

This standard identifies the competencies you need to carry out thermal spraying processes to various substrates, in accordance with approved procedures. You will be required to access the appropriate specifications, to check that these are the latest issue and to extract all necessary information to carry out the thermal spraying operations. You will be required to carry out all necessary preparations to the base materials prior to spraying them and this will include such items as cleaning, degreasing, masking and other appropriate treatments. You will be expected to make any necessary adjustments to the thermal spraying equipment and consumables, to give satisfactory deposits at optimal productivity levels. You will be expected to identify any spraying/coating defects and to carry out the necessary actions and adjustments to equipment and consumables in order to correct them. You will need to carry out tests on the components to ensure that deposited layers meet their specification requirements. Your responsibilities will require you to comply with organisational policy and procedures for the thermal spraying activities undertaken and to report any problems with these activities or with the materials and equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying thermal spraying methods, techniques and procedures. You will understand the thermal spraying processes used and their application, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the finished components are to the required specification. You will understand the safety precautions required when carrying out the preparation and thermal spraying operations. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace and towards the environment.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation, regulations, directives and other relevant guidelines 2. follow relevant instructions and specifications for work 3. ensure the material surfaces to be treated are prepared for the finishing operations 4. check that the finishing equipment and treatment solutions are set up and maintained at satisfactory operating conditions and levels 5. carry out spraying activities to specification by following operating procedures 6. ensure that the treated workpiece achieves the required characteristics and meets the finishing specification 7. deal promptly and effectively with problems within your control and report those that cannot be solved 8. ensure that work records are completed, stored securely and available to others, as per organisational requirements 9. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials) 2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you 3. the hazards associated with the activities, and how to minimise them and reduce risks 4. the personal protective equipment and clothing (PPE) to be worn during the activities 5. the types of specifications that are used for the spraying operations 6. the thermal spraying techniques that are used and their typical applications 7. the basic principles of operation of the thermal spraying equipment being used 8. what surface preparations need to be carried out on the materials, prior to spraying them 9. properties of metal sprayed deposits 10. why different materials and components require different spraying methods and spraying mediums to be used 11. the various spraying mediums and consumables that are used and their safe handling and storage requirements 12. how to check that the spraying plant, equipment and mediums are fit for purpose 13. how to check the equipment safety systems are adjusted and operating correctly 14. how to adjust the spraying parameters to ensure the workpiece achieves the correct coverage and depth of coating 15. the operational procedures relevant to the particular thermal spraying process being used, and how these procedures can be varied to improve efficiency 16. methods of setting up the component to give optimal coating and freedom from distortion; the use of jigs/fixtures, manipulators and positioners 17. the types of problems that can occur with thermal spraying and how they can be rectified 18. the types of defects that can occur on the sprayed components, their causes and method of rectification and prevention 19. the effects of contaminants in metal spraying mediums 20. how to test the sprayed/coated components for specification compliance (to include mechanical measurement and non-destructive testing (NDT) techniques) 21. the organisational quality systems used and coating standards to be achieved 22. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve 23. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1. Carry out the thermal spraying, completing all of the following activities: 1. use the correct issue of thermal spraying process documentation and other related specifications 2. adhere to health and safety regulations, systems and procedures to realise a safe system of workensure the equipment is correctly prepared for the spraying operations 3. clean all tools and equipment on completion of the spraying activities 4. complete the production documentation (such as condition/pre-treatment of substrates, coating material preparation, equipment settings, confirmation of standard of finish) 5. leave the work area in a safe and clean condition 2. Carry out thermal spraying operations, using one of the following types of equipment: 1. handheld equipment 2. manually controlled machine 3. computer controlled equipment 3. Carry out thermal spraying operations using two of the following methods: 1. combustion wire (metal spray) process 2. combustion powder (powder flame spray and low velocity oxygen fuel) process 3. arc wire thermal spray process 4. plasma thermal spray process 5. high velocity oxygen fuel (HVOF) spray process 6. detonation gun thermal spray process 7. kinetic metallization (KM) thermal spray process 4. Carry out the thermal spraying process on two of the following materials: 1. ferrous steel 2. alloy steel 3. non-ferrousplastics and composites 5. Use two of the following types of coating materials during the thermal spraying activities: 1. pure metal powder or wires (aluminium, zinc, copper, nickel, brass, titanium, stainless and carbon steel) 2. metal alloy powders or wires (such as aluminium based, cobalt based, molybdenum and nickel based, iron based) 3. inconals 4. ceramics 5. tungsten and chrome carbides 6. Prepare the components for the thermal spraying operations, by carrying out three of the following activities: 1. cleaning/degreasing 2. mounting in jigs with integral masking 3. masking/protecting 4. jigging components, which are masked prior to spraying 5. wiring/suspending 6. mounting in/on tables or rotating devices 7. Carry out thermal spraying operations that cover both of the following: 1. single stage treatment 2. multiple stage treatments 8. Monitor the thermal spraying operation and equipment function, and make adjustments, as necessary, to parameters and mechanisms, to include all of the following (as appropriate to the equipment type): 1. electrical parameters 2. operating parameters 3. deposition rate 4. powder dispensing and recovery mechanisms 5. wire feed rate 6. safety devices 7. gas systems (combustion and carrier) 8. mechanical functions (handling, loading, workholding, transfer) 9. Carry out one of the following quality control procedures: 1. thickness testing by electromagnetic induction 2. thickness testing by eddy current permeability 3. thickness testing by X-ray fluorescence 4. direct measurement using instruments 10. Check thermal spraying activities comply with one of the following quality and accuracy standards: 1. Military or aviation authority standards 2. current industry standards and codes of practice 3. international standards 4. company standards and requirements 5. customer standards and requirements

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